**Neurochemistry 1, 2, 3 (Mooney): Worksheet**

**IONOTROPIC NEUROTRANSMISSION:**

Receptor Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Examples:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Response (fast or slow): \_\_\_ EPSPs and \_\_\_ IPSPs

Onset: \_\_\_\_\_\_\_\_\_\_

Duration: \_\_\_\_\_\_\_\_\_\_\_\_

Structure: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Opening of channel: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Closing of channel: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**METABOTROPIC NEUROTRANSMISSION:**

Receptor Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Response (fast or slow): \_\_\_ EPSPs and \_\_\_ IPSPs

Onset: \_\_\_\_\_\_\_\_\_\_

Duration: \_\_\_\_\_\_\_\_\_\_\_\_

Structure: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Steps in Activation/Inactivation:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Subtypes:

**G Protein 🡩/🡫 Effectors**

\_\_\_\_\_\_\_\_ \_\_\_\_ Adenylyl cyclase

\_\_\_\_\_\_\_\_ \_\_\_\_ Adenylyl cyclase

\_\_\_\_\_\_\_\_ \_\_\_\_ Phospholipase C

\_\_\_\_\_\_\_\_ \_\_\_\_ K+, Ca2+ channels

Modes of G-protein operation:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| **SECOND MESSENGERS + NEURONAL TARGETS** | | |
| **Second Messenger** | **Enzyme of Synthesis + G Protein or Source** | **Target** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**ADENYLATE CYCLASE ACTIVITY: GS and GI**

|  |  |  |
| --- | --- | --- |
|  | **Stimulatory** | **Inhibitory** |
| **G protein** |  |  |
| **🡩 or 🡫 cAMP** |  |  |
| **Receptor Examples** |  |  |

*Remember*: Cyclic nucleotide-gated (e.g. cAMP) channels levels affect the likelihood a channel will open

Protein kinases (e.g. PKA) phosphorylate proteins

|  |  |  |
| --- | --- | --- |
| **SUBSTRATES OF NEURONAL PROTEIN KINASES** | | |
| **Substrate** | **Example** | **Function** |
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|  |  |  |
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|  |  |  |

|  |  |  |
| --- | --- | --- |
| **RECEPTORS ASSOCIATED WITH VARIOUS NEUROTRANSMITTERS** | | |
| **Neurotransmitter** | **Receptor Type** | **Effect** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

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| --- | --- | --- | --- |
| **Catecholamine Receptor Subtypes** | | | |
| **Neurotransmitter** | **Receptor Type** | **🡩/🡫** | **Effector** |
| **Dopamine** | D1 or D5 |  |  |
| D2, D3, D4 |  |  |
| **Norepinephrine** | α1 |  |  |
| α2 |  |  |
| β |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Acetylcholine Receptor Subtypes** | | | |
| **Neurotransmitter** | **Receptor Type** | **🡩/🡫** | **Effector** |
| **ACh** | Nicotinic |  |  |
| m1, m3, m5 |  |  |
| m2, m4 |  |  |

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| --- | --- | --- | --- |
| **Amino Acid Receptor Subtypes** | | | |
| **Neurotransmitter** | **Receptor Type** | **🡩/🡫** | **Effector** |
| **GABA**  (inhibitory) | GABAA |  |  |
| GABAC |  |  |
| GABAB |  |  |
| **Norepinephrine**  (excitatory) | AMPA/Kainic Acid |  |  |
| NMDA |  |  |
| Metabotropic |  |  |

Keep in mind still which are fast and slow acting

|  |  |  |
| --- | --- | --- |
| **COMPARISON: NICOTINIC VS. MUSCARINIC RECEPTORS** | | |
| **Receptor** | **NICOTINIC** | **MUSCARINIC** |
| **Agonist** |  |  |
| **Antagonist** |  |  |
| **Location** |  |  |
| **Ionotropic/Metabotropic** |  |  |
| **Fast or slow (EPSP or IPSP)** |  |  |

|  |  |  |
| --- | --- | --- |
| **PHARMACOLOGY OF CATECHOLAMINE NTs** | | |
| **Drug** | **Functional Action** | **Neurochemical Action** |
| **Neuroleptic (Haloperidol)** |  |  |
| **Reserpine** |  |  |
| **Tricyclic Antidepressant; Cocaine** |  |  |
| **MAO Inhibitor** |  |  |
| **Amphetamine** |  |  |

|  |  |  |
| --- | --- | --- |
| **COMPARISON: GABA VS. GLYCINE** | | |
| **Amino Acid** | **GABA** | **Glycine** |
| **Synthesized from** |  |  |
| **Excitatory or Inhibitory** |  |  |
| **Location** |  |  |
| **Receptor/Channel** |  |  |

|  |  |  |
| --- | --- | --- |
| **PATHOLOGICAL CONDITIONS FROM NT IMBALANCE** | | |
| **Condition** | **NT Imbalance** | **Location** |
| **Parkinson’s Disease** |  |  |
| **Schizophrenia** |  |  |
| **Alzheimer’s Disease** |  |  |
| **Huntington’s Chorea** |  |  |
| **Myasthenia Gravis** |  |  |